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PATENT SPECIFICATION

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Classes (81.2; 81.1; 78.9).

Drawing attached.

COMPLETE SPECIFICATION.

"Improvements in a shuttering assembly, a wall tie suitable for use thereon, and a process of assembling same."

I, ROY WILLIAM RUMBLE, Housing and Civil Engineering Contractor, of 39 van der Walt Street, Pretoria, Transvaal Province, Union of South Africa, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:

This invention relates to shuttering for cavity walls and similar hollow elements made of set moulded material such as concrete; and particularly for such walls or building elements moulded in position.

A shuttering assembly for a cavity wall or similar hollow building element according to the invention comprises external shutter walls composed of separate panels or units engaged edgewise and core shuttering for forming the cavity, said core shuttering being positioned between and spaced from the external shuttering, and being retained in position against transverse movement by engagement with cross ties secured to the external shutter walls by being engaged between

adjoining edges of the said panels or units.

To ensure rigid tying of the core shuttering to the external shuttering walls it is preferred to make each tie in one piece and to carry it through the core shuttering, which latter accordingly may also be formed of panels or units arranged side by side, the ties extending between the adjoining edges of the core panels or units.

The ties are constructed with a middle portion that thus passes through the core shuttering; and, at each side of said middle portion, with pairs of shoulders that engage the opposite faces of the core panels or units. Said middle portion may be thin enough to pass through the joints without opening the latter to an extent that is material in concrete shuttering. Similarly the ends of the ties may be thin to engage between the adjoining edges of the external shuttering without materially opening them. It is convenient to engage said ends between adjoining

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horizontal edges of the outside shuttering and between adjoining vertical edges of the core shuttering; and said thin middle and end portions of the ties being correspondingly formed at right angles to one another.

It is a feature of the invention that the ties are adapted to serve the two purposes of tying and spacing apart the three shuttering walls, and of remaining in the moulded hollow wall to brace together the two thicknesses of said wall. A tie suitable for this purpose may be made of flat strip. It comprises end portions adapted to be engaged with the two external shutter walls to brace them together, a middle portion providing opposite shoulders adapted to engage with the core shuttering and position the latter against transverse movement, and intermediate portions adapted to be embedded in and key with the thicknesses of the moulded wall.

The panel joints are preferably of the tongue and groove type, in which case the portions of the tie that engage with them are shaped correspondingly to this form. By means of such tongue and groove joints it is possible to erect the outside shuttering, and consequently the core shuttering, without the assistance of pre-erected scaffolding.

The invention comprises the process of assembling shuttering for a moulded hollow wall, which consists in erecting two external shuttering walls by assembling shuttering panels or units in edgewise engagement at horizontal joints, placing core shuttering in position between said external shuttering walls; and, during the erection, engaging the ends of loose cross ties with the exposed upper edges of said panels or units of the outer shuttering walls, and also engaging said ties with the core shuttering, so that as the said cross ties are secured by engagement of further panels above such exposed edges, they determine the horizontal spacing apart of the two external shuttering walls and the horizontal spacing of the core shuttering between them.

An example of the invention is shown in the accompanying drawing in which:

Figure I shows a hollow concrete wall, with ties spanning the wall cavity and connecting the two thicknesses of the wall;

Figure II illustrates the shuttering assembly for moulding the cavity wall of Figure I;

Figure III is an enlarged view of the ties shown in Figure I;

Figure IV is an enlarged horizontal section through the wall and the shuttering; and

Figure V is a plan view showing two diagonal ties.

Figure I shows the wall as it appears after it has been moulded and the shuttering has been removed. The wall consists of the two thicknesses 3, 4 spaced apart by the cavity 5. The thicknesses 3, 4 are braced together by the ties 6, embedded in them and spanning the cavity 5..

Referring to Figure II, the shuttering comprises the two external shuttering walls 7, 8 each consisting of a number of panels 9 engaged at their edges. Said panels may be constructed as described in my prior Australian Letters Patent No. 128126 and are so shown with interengaging edges 10, 11 of general tongue and groove form.

The core shuttering, indicated by 12, is positioned between the external shuttering walls 7, 8 to provide, between itself and the external shuttering at each side of it, the moulding spaces 13, 14 in which the two thicknesses 3, 4 of the wall are to be moulded. Said core shuttering is divided into sections 15, arranged side by side with their vertical edges 16 adjoining, so that said sections can be separately withdrawn upwardly from the cavity 5 after the wall has been moulded.

The ties 6 are made in one piece of flat metal strip. They are shaped to include two similar end portions 17 bent to a channel form in cross section to fit between and conform to the tongue 10 and groove 11 of the horizontal joints

18 between the panels of the external shuttering walls 7, 8. Within said end portions 17 are the pair of intermediate portions 19 which, in the shuttering assembly, cross the spaces 13, 14 and which, after the concrete wall is formed, remain embedded in the wall thicknesses 3, 4. These intermediate portions 19 are preferably stiffened to enable them to act as struts when spacing the shuttering walls 7, 8 and 12; and they may also be shaped to cause them to key firmly into the concrete. These effects are produced in the example shown by means of the pressed up ribs 20.

The central portion 21 of the tie is flattened in a vertical plane at right angles to the end portions 17, in order to pass through the adjoining vertical edges 22 of the core shuttering 11. At the junction of the central portion 21 and the intermediate portions 19, 19 are the opposed pairs of shoulders 23, 24 spaced apart along the length of the tie according to the thickness of the core shuttering and so that they engage the opposite faces 25, 26 of said core shuttering in the neighbourhood of the vertical edges 16.

A convenient procedure in erecting the shuttering is to place a series of ties (indicated by "a" in Figure II) on the foundation 27 on which the concrete wall is to be erected. Said series "a" may be positioned in predetermined lines to define the plan of the wall. A bottom course "b" of panels 9 is stood upright on these ties with the grooved panel edges 11 engaged with the formations 17 of the ends of the ties; which ties thus determine the proper spacing apart of the feet of the two external shuttering walls.

The core shutter units 15 are also stood on the foundation 27 with their pairs of adjacent edges 16 engaged between the pairs of shoulders 23, 24 of the ties 6. The spacing of the foot of the core shuttering wall relatively to the feet of the external shuttering walls is thus determined.

Another series "c" of ties is now laid

over the tongues 10 on the upper exposed edges 28 of the lower course panels; said ties "c" being brought into position by for example inserting their central portions 21 into the upper ends of the adjoining vertical edges 22 and sliding the ties down to rest on the edges 28. The extremities 17 of the ties "c" are properly engaged with the tongue formation 10 of said upper edges 28, whilst their central portions 21 are, as stated, engaged with the edges 16 of the core units 15; with the result that this series "c" of ties co-operates with the bottom series "a" of ties to cause the external shuttering walls and the core to be held truly parallel with one another. The end 17 of the ties are secured in the position stated by the weight of the next course of panels.

Upon the concrete mix being inserted into the moulding spaces 13, 14 the intermediate portions 19 of the ties become embedded in the mix; and upon the shuttering being disassembled the intermediate and central portions 19 and 21 of the ties remain as ties between the concrete wall thicknesses 3 and 4. The end portions 17 of the ties are usually cut off flush with the external surfaces of the wall.

Figure V shows ties generally similar to those described, but having their end channel formations 17a and their central formations 21a skewed with regard to the outline of the end and intermediate parts as they appear in plan. Thus said ties take up an inclined position in plan when put into place. As they are left in the wall, they serve as diagonal braces therein. It is preferred to slant them alternately in opposite directions as appears in the Figure. In such ties it is convenient to provide the shoulders 23, 24 by plate 29 welded to the tie proper.

Having now fully described and ascertained my said invention and the manner in which it is to be performed, I declare that what I claim is:—

1. A shuttering assembly for a cavity wall or similar hollow building element, comprising external shuttering walls com-

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posed of separate panels or units engaged edgewise, and core shuttering for forming the cavity, said core shuttering being positioned between and spaced from the external shutter walls and being retained in position against transverse movement by engagement with cross ties secured to the external shutter walls by being engaged between adjoining edges of the said panels or units.

2. The assembly claimed in claim 1 in which each tie is made in one piece and extends between the core shuttering.

3. The assembly claimed in claim 2 in which the core shuttering consists of panels or units arranged side by side and the ties extend between adjoining edges of the core panels or units.

4. The assembly claimed in claim 3, in which the ties are each formed with a pair of opposed shoulders to engage the opposite faces of the core panels or units.

5. The assembly claimed in claim 4, in which the portion of the tie between the shoulders is of small width suitable to extend between adjoining edges of the units constituting the core.

6. The assembly claimed in claim 4 or 5, in which the ties have thin ends suitable to be inserted between adjoining edges of the units constituting the elements of the external shuttering.

7. The assembly claimed in claim 6, in which the ties are inserted between adjoining horizontal edges of the external shuttering and between adjoining vertical edges of the core shuttering.

8. A wall tie suitable to be used in an assembly such as is claimed in any of the above claims and to serve first as a tie between external shutter walls composed mainly of panels or units engaged edgewise, and core shuttering for a moulded cavity wall or similar hollow building element, and thereafter as a tie between the moulded wall thicknesses and extending across the wall cavity, said tie comprising end portions having formations extending transversely to the length of the tie and adapted to be engaged between adjoining horizontal edges of the panels or units of the

external shutter walls to brace the walls together, a central portion providing opposite shoulders adapted to engage with the core shuttering and position it against transverse movement, and intermediate portions adapted to be embedded in and key with the thicknesses of the moulded wall.

9. The tie claimed in claim 8 and suitable to be used when the core shuttering is composed mainly of panels or units arranged side by side with their vertical edges adjoining; in which the central portion of the tie has formations extending transversely to the length of the tie but perpendicular to the extension of the ends, and thus suitable to be engaged between adjoining vertical edges of the panels or units of the core shuttering.

10. The tie claimed in claim 8 or 9, in which the tie is a strip of sheet metal the end portions of which are bent to channel section to engage the similar edges of shuttering panel.

11. The process of assembling shuttering for a moulded hollow wall, which consists in erecting two external shuttering walls by assembling shuttering panels or units in edgewise engagement at horizontal joints, placing core shuttering in position between said external shuttering walls; and, during the erection, engaging the ends of loose cross ties with the exposed upper edges of said panels or units of the outer shuttering walls, and also engaging said ties with the core shuttering, so that as the said cross ties are secured by engagement of further panels above such exposed edges, they determine the horizontal spacing apart of the two external shuttering walls and the horizontal spacing of the core shuttering between them.

12. The process claimed in claim 11 in which the core shuttering is composed of panels or units and the cross ties are engaged between adjoining vertical edges of the panels or units.

13. The process claimed in claim 11 or 12, in which the panels of the outer shuttering are so engaged with one an-

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other that upper courses are held in position by those below them without assistance from pre-erected scaffolding.

14. The shuttering assembly for moulding a hollow concrete or like wall substantially as described with reference to the accompanying drawings.

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Dated this fourth day of April 1949,

ROY WILLIAM RUMBLE,
By his Patent Attorneys,
SPRUSON & FERGUSON

Witness.—L. Selleck.

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